Address Westside Priority Soils OU—Butte, Montana--Now

Submitted by: Dr. John W. Ray

Westside Priority Soils, which the EPA called for a long time "Non-priority soils" should be addressed immediately. It is time to "get-moving" in a substantive way to clean up the Westside Priority Soils Operable Unit. EPA cannot continue to ignore the serious potential threat to human health The EPA needs to:

1. Appoint, without delay, a remedial project manager for the site.
2. Clearly delineate the boundaries of the Westside Priority Soils OU. There is a general idea of what comprises Westside Priority Soils—most of Butte other than the Butte Hill—but the boundaries need to be clearly specified.
3. Determine the types and levels of contamination at the site.
4. Conduct a current risk assessment.
5. Produced proposed plans for cleaning up the area
6. After public input, determine a remediation plan and implement it.
7. Throughout all phases of the project, keep the public informed of progress or lack thereof.

The Westside Priority Soils Operable Unit has been out there for decades and been ignored for decades. Butte cannot be cleaned up unless this area is cleaned up. EPA needs to articulate a clear and firm schedule for addressing and remediating Westside Priority Soils. Are we only going to clean up some of Butte?

Westside Priority Soils would seem to include all of Butte except for the Pit, BPSOU and Streamside—a large area where people live and, in some cases, where people recreate.

Why should Westside Priority Soils be an EPA priority?

A. At a minimum, arsenic and lead are present at the site. In addition, we know that there are also mine dumps and tailings. Other contaminants associated with past mining or smelting activities could be present.
B. This arsenic and lead presents a threat to human health and is covered under Superfund.
C. There is an environmental justice community within the area whose needs should be addressed.

Why would anyone logically conclude that contaminated homes, yards, open areas, etc. only are found on the Butte Hill?

The contaminants of concern for Westside Priority Soils, primarily lead and arsenic, are serious potential threats to human health and, because they are probably and primarily the result of past mining activity, should be remediated under Superfund.

Regarding the potential health effects of toxic attic dust found in housing units in the Westside Priority Soils area, we know the following:

1. Inorganic arsenic that may well be found in attics and yards in the Westside Priority Soils area, even at low levels of exposure, poses a serious threat to human health. Arsenic has been designated a human carcinogen. Arsenic can cause cancer of the lungs, liver and skin. Long-term exposure to arsenic can cause alterations in mental functions and depression. (*Staying Healthy in a Risky Environment*, New York University Medical Center, p. 365 and 428) Arsenic exposure at low doses can cause nerve damage, cardiovascular problems, skin problems and constitutional complaints such as nausea, diarrhea, gastrointestinal upset, etc. (Johnson and DeRosa, ASTDR, "The Toxicologic Hazard of Superfund Hazardous Waste Sites") [See also: Paul F. Holt, Department of Chemistry, University of Reading, UK, *Inhaled Dust and Disease*, p. 245. which discusses the causative effect of arsenic on heart disease.] Arsenic targets most of the body's organs and is particularly harmful to the gastrointestinal tract and to the skin. Outdoor play is a common arsenic exposure route for children. Attics in Westside Priority Soils area may well be contaminated with a host of toxics, in addition to inorganic arsenic, related to past mining/smelting activities.
2. The Trivalent arsenic that is probably present in Westside Priority Soils attics is a proven human carcinogen. One form of human cancer directly linked to trivalent arsenic is skin cancer that has above average levels in Butte. (NIOSH, Tenth Report on Carcinogens, *Arsenic Compounds, Inorganic*. See also: International Agency for Research on Cancer, *IARC Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man*, Vols. 2 and 23 and Supplements 4 and 7, USEPA, Integrated Risk Information System, *Arsenic, inorganic* (CASRN 7440-38-2) and Dennis M. Opresko, Ph.D., Chemical Hazard Evaluation and Communication Group, Biomedical and Environmental Information Analysis Section, Health and Safety Research Division, Oak Ridge Reservation Environmental Restoration Program, Risk Assessment Information System, 1997) Not only is trivalent arsenic carcinogenic, even at low doses, [Arsenic exposure at low doses can cause nerve damage, cardiovascular problems, skin problems and constitutional complaints such as nausea, diarrhea, gastrointestinal upset, etc. (Johnson and DeRosa, ASTDR, *The Toxicologic Hazard of Superfund Hazardous Waste Sites*)] but it is also genotoxic. (Mass et al.,*Chem. Res. Toxicol.* 14:355-36, April 16, 2001) The EPA has specifically endorsed this genotoxic conclusion. (April 2001) "Inorganic arsenic is readily absorbed through ingestion and is widely distributed in the human body. It does not need metabolic activation to exert its effect." (Chiou, et. al., *Incidence of transition cell carcinoma and arsenic*, American Journal of Epidemiology 153 (5): 411-418, 2001)
3. Moreover, there are no known safe levels of exposure to inorganic arsenic. Trivalent arsenic bioaccumulates in tissue and is excreted very slowly. (Dr. Ronald Brecher, *Arsenic*, EBI, Canada and Aapo Saask, *The Arsenic Challenge*, Scarab Development AB, Stockholm, Sweden) Finally, trivalent arsenic causes a host of other serious medical problems. (Holt, *Inhaled Dust and Disease*, *op. cit.*; Norman Trieff, *Environment and Health*, Ann Arbor Science Publishers Inc.; Graber and Upton, *Staying Healthy in a Risky Environment: The New York University Medical Center Family Guide*; ATSDR; OSHA; NIOSH; and USEPA.) A study published in *Geosciences* (2014, 4, 128-175; doi: 10:3390) entitled "Health Effects Associated with Inhalation of Airborne Arsenic Arising from Mining Operations" by Martin, et. al. reaches this conclusion: "Arsenic in dust and aerosol generated by mining, mineral

process and metallurgical extraction industries is a serious threat to human populations throughout the world. Major sources of contamination include smelting operations, . . . mining, as well as associated waste products, including mine wastes and tailings." The article goes on to demonstrate that most arsenic that threatens human health is not naturally occurring but the result of mining and smelting activities. For example, about 60% of the annual global emissions of arsenic results from copper smelting—no stranger to Butte and Anaconda. Only about 2% comes from natural sources. This arsenic, the article concludes, is highly toxic to human health.

4. Trivalent Arsenic is one of the major contaminants of attic dust on the Butte Hill as well as Butte generally, including the Westside Priority Soils area. The gross geologic morphology of the attic arsenic dust would lead to that conclusion.
5. There is strong evidence that a significant amount of the trivalent arsenic present in attics came from the Anaconda Smelter, which is a Superfund site. For some reason, EPA has never been willing to admit this. Why? Clearly, if the arsenic found in attics throughout Butte originated from the Anaconda Smelter, there is no question that this is a Superfund issue and needs to be remediated under Superfund.
6. To the extent that trivalent arsenic is found in the attics of homes constructed after smelter operations ceased on the Butte Hill, the 1920s, there would exist the strong presumption that such arsenic emanated from Anaconda. By the EPA's own assumptions, trivalent arsenic was not characteristic of the arsenic found in Butte soils but is characteristic of the arsenic found in Anaconda.
7. The prevailing wind patterns in Southwestern Montana clearly indicate that the prevailing winds flow from the Anaconda Smelter to Butte—hence a plume of trivalent arsenic contamination could have reached Butte.
8. The Final Risk Assessment-BPSOU Baseline Human Health Risk Assessment for Arsenic, April 29, 1997 notes: "Aerial emissions from the mills and smelters, **as well as the Anaconda Smelter**, also contributed to the BPSOU." (p. 1-2, emphasis supplied.) There is no reason to believe that the Arsenic from the Anaconda Smelter just contaminated the Butte Hill and miraculously spared the Westside Priority Soils OU.
9. Inorganic arsenic contamination releases result from the ore smelting process. (See: Paul F. Holt, *Inhaled Dust and Disease*, (New York: John Wiley and Sons, 1987. See also: *Arsenic* (ATSDR)"While arsenic is released to the environment from natural sources such as wind-blown dirt and volcanoes, releases from anthropogenic sources far exceed those from natural sources." (ATSDR) Mining and smelting are major causes. "The soil receives arsenic from a variety of anthropogenic sources, including. . . smelting operations, mining wastes. Mine tailing and smelter slag was estimated to add an additional, 200-11000 and 4,500 –9000 metric tons respectively. . . .abandoned mine tailings add still more."
10. **Conclusion**: The Anaconda Smelter would seem to be the only practical source for this trivalent arsenic found in Butte attic dust. What other major source exists? Thus, the presence of arsenic in Butte attics is a direct result of mining activity which is covered by Superfund.
11. Trivalent Arsenic in Butte has never been specifically addressed by the EPA. The 1997 Health Risk Assessment for arsenic and subsequent health studies for Butte Priority Soils do not specifically and directly consider trivalent arsenic found in Butte attics. The 1997 Health Risk Assessment for arsenic and subsequent studies only consider the levels of trivalent arsenic found in soil as a potential source of the dust home contamination problem. This is deceptive in that arsenic is water soluble and would have been washed away to a large extent

given rain, snow melt, wind, etc. However, the fine trivalent arsenic dust found in attics would not have been washed away by rain and snowmelt. Wind would not have blown away the trivalent arsenic found in attics. It is totally plausible that there would be low level of trivalent arsenic in the soil while having high levels of trivalent arsenic in attics. Arsenic does not lose it toxicity over time.

The contaminated dust found in many Butte attics poses a direct threat to human health if people were to be exposed to these contaminants.

The contaminants found within the Westside Priority Soils OU clearly fall under the purview of Superfund. This contamination should be cleaned up under Superfund. If , as appears likely, the attic dust found in the Westside Priority Soils area emanated from past smelting activities, this dust needs to be remediated under Superfund.

The dust obviously entered the attics. What enters can leave, if disturbed. Saying that no pathways of contamination currently exist does not provide any permanent remediation of the threat of toxic attic dust. New and Expanded Pathways of exposure can be created by:

a. Remodeling and Painting
b. Use of the attics for storage
c. Weatherization
d. Deterioration of ceilings.
e. Damage or deterioration of roofs.
f. Modifying the attic through such measures as adding electrical wires, skylights, ceiling fans, electric lights or working on the roof.
g. Fires
h. Subsidence and cracking
i. Cleaning
j. Wind, rain, hail and or water from storm events.

The dust obviously fell on yards. Why only remediate yards on the Butte Hill?

Analogous arguments to those presented above with regard to arsenic could be made regarding lead which is a potent neurotoxin. EPA has already determined that the lead on the Butte Hill is covered under Superfund, so should the lead in Westside Priority Soils be considered.

Lead

> Since one molecule of lead, when it enters a cell, will change the state of that cell, the theoretical question: 'What is an adverse health effect?' becomes important. Dr. H. L. Neddleman

Lead acts the same once it gets into a child's body no matter what the route of exposure. Fifty percent of the lead swallowed by children enters their blood and other body parts even if their stomachs are full. For children, 73% of the lead in their body is in bones and teeth. Only 23% of

the lead taken into a child's body will leave in the body's waste. (U.S. Department of Health and Human Services)

One must also consider the sub-clinical health effects of long term, chronic exposure to low levels of lead which have been shown to cause nervous system problems, renal problems, reproductive system problems, interference with enzyme activity, and cancer. *The New England Journal of Medicine* and the American Academy of Pediatrics have claimed that even exposure to amounts of lead considered safe for children have caused lower scores on problem solving tests, lower perception levels, memory loss and learning and coordination disability. Another study found that "Children with only 5 to 7 ug/dl of lead show learning damage, damage to the central nervous system, stunted growth, reduced IQ and other neurobehavioral abnormalities." ("Establishing a Health Based Standard for Lead in Residential Soils," by Patrick Reagan and Dr. Ellen Silbergled, *Trace Substances in Environmental Health.*) The ASTDR (Agency for Toxic Substances and Disease Registry, U.S. Department of Health and Human Services) has noted: "Studies on the effect of lead in children have demonstrated a relationship between exposure to lead and a variety of adverse health effects. These effects include impaired mental and physical development, decreased heme biosynthesis, elevated hearing threshold, and decreased serum level of vitamin D. The neurotoxicity of lead is of particular concern, because evidence from prospective longitudinal studies has shown that neurobehavioral effects, such as impaired academic performance and deficits in other skills, may persist even after lead levels have returned to normal. (ASTDR, "Analysis Paper: Impact of Lead-Contaminated Soil on Public Health," May 1992) It is also reported that the harms are virtually permanent. No wonder the former head of the U.S. Public Health Service, James Mason has concluded: "The more we learn (about lead) the more toxic we find it to be."

Also, it takes very little exposure to lead to cause severe health problems. For example, a child can become severely lead poisoned (60-80 ug/dl) by ingesting only 1 milligram of lead contaminated dust. This is the equivalent of 3 granules of sugar. 35 ug/dl can occur by ingesting approximately 1/3 milligram of lead contaminated dust which is the equivalent of 1 granule of sugar. (*Newsweek*, July 15, 1991) The American Academy of Pediatrics has boldly stated that the only desirable amount of human lead exposure is zero. It is also important to remember that children normally ingest 1 to 3 tablespoons of dirt per day. (EPA and New York State Health Department) The ASTDR in its "The Nature and Extent of Lead Poisoning in Children in the United States: A Report to Congress" demonstrates that when lead is present in the soil, children **will** ingest it and we **will see** elevated lead levels in children. "A strong positive correlation is found between exposure to lead-contaminated soil and lead levels." (ASTDR)

No wonder that lead is ranked as "the number one priority hazardous substance" at NPL sites. (ASTDR, "Analysis Paper: Impact of Lead-Contaminated Soil on Public Health," May 1992)

Conclusion

Why are we to assume that the contamination found on the Butte Hill, suddenly stops at Front Street and south of the Pit? The point is that there is no logical or compelling reason why Westside Priority Soils has been neglected for so long. EPA must address this OU NOW!